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Water Preserve Area Feasibility Study

The following components have been identified as being located within the boundaries of the Southern Palm Beach County subregional model. The component descriptions are from Alternative D13_R (selected as the initial draft plan for the C&SF Comprehensive Review Study), and from other project elements (OPEs). These components have been outlined in the component descriptions in a very conceptual way. Some additional level of incidental design has been expended on several of the components in order to allow the component to be included in the subregional model.

Component L

Geographic Region: Lower East Coast Service Area

Component Title: Change coastal wellfield operations

Purpose: Shift demands from eastern wellfields to western facilities away from the saltwater interface to reduce impact of salt water intrusion.

Operation: For coastal utilities in the Lower East Coast Service Area which are experiencing an increased threat of saltwater intrusion, demands will be shifted from the eastern facilities to the western facilities away from the saltwater interface. The volume shifted is dependent upon the degree of saltwater intrusion but is generally proportional to the increase in demands between the 1995 existing conditions and the 2050 future without project conditions unless otherwise noted.

Design: For this alternative the following utilities have a portion of their demands shifted inland and include Riviera Beach, Lake Worth, Lantana, Manalapan, Boca Raton, Hollywood (including Broward County 3B and 3C), Dania, Miramar, Broward County 3A, Hallandale and Florida City. Redistribution of demands for Lake Worth, Lantana, Manalapan, Boca Raton and Florida City are generally consistent with the Lower East Coast Water Supply Plan. For the City of Riviera Beach, demands will be shifted from the eastern facilities to the western facilities with the western facilities absorbing the increased demand between the 1995 and 2050 conditions. For this alternative, the City of Miramar's eastern wellfield will be placed on standby and all demands will be met from the western wellfield. For the City of Hollywood, Hallandale, Dania, Broward County 3A, and Broward County 3B/3C all these wellfields will be placed on standby and the entire demand (with the exception of 4 MGD from the Floridan aquifer for Hollywood) will be met from the South Broward County Regional wellfield. Recharge to the Regional wellfield will be met through the existing canal system supplied from locally captured runoff from the C-9 Basin (Components R and S).

Location: Lower East Coast Service Area.

Counties: Broward, Miami-Dade and Palm Beach.

Assumptions and related considerations:

1) It is assumed that the western facilities of the individual utilities have sufficient capacity to meet the increased demands.

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Component KK4

Geographic Region: Water Conservation Area 1

Component Title: Loxahatchee National Wildlife Refuge Internal Canal Structures

Purpose: Improve timing and location of water depths in the Refuge.

Operation: Structures would remain closed except to pass Stormwater Treatment Area (STA) 1 East and STA – 1 West outflow and regional water supply deliveries. The STA 1 East and 1 West discharges and regional water supply deliveries are not comparable in water quality with the water in the center of the Refuge. The structures will therefore be opened when discharges and deliveries are being made in order to route these flows around the Refuge in the perimeter canals.

Design:

- 1) L-7 borrow canal structure: 1500 cfs gravity structure at 0.5 foot of head to consist of a gated spillway with two 18' wide gates.
- 2) L-40 borrow canal structure: 1500 cfs gravity structure at 0.5 foot of head to consist of a gated spillway with two 18' wide gates.

Location: The L-7 structure is located at cell R50C28 in the L-7 Borrow Canal within the Loxahatchee National Wildlife Refuge. The L-40 structure is located at cell R50C34 in the L-40 Borrow Canal within the Refuge.

Counties: Palm Beach

Assumptions and related considerations:

- 1) STA discharges to the Loxahatchee National Wildlife Refuge are assumed to be of acceptable water quality.

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Component LL6

Geographic Region: Lower East Coast Service Area 1

Component Title: C-51 Regional Groundwater Aquifer Storage and Recovery (ASR)

Purpose: This is a regional groundwater aquifer storage and recovery system which will capture and store excess water during wet periods and recover the water for utilization during dry periods. The ability to use the recovered water during dry periods will increase regional water resources.

Operation: Water will be captured and stored when water is being discharged out of S-155 to tide. Water will be recovered during dry periods to maintain canal elevations.

Design: This component consists of 34 well clusters primarily located along the West Palm Beach Canal (C-51 Canal), each being composed of two (2) surficial aquifer wells and one Upper Floridan aquifer ASR well. The surficial aquifer wells will each have a 2.5 MGD withdrawal capacity and be located in proximity to the canal so that the water withdrawn would result in the interception of water that would otherwise go to tide in wet periods. Each upper Floridan aquifer ASR well will have a capacity of 5 MGD. The total injection and recovery capacity of the ASR system is 170 MGD or about 264 cfs. In addition to the well clusters located along the south side of the C-51 Canal, well clusters will be located along the shorelines of Lake Clarke and Lake Osborne. Lake Clarke has an open connection to the C-51 Canal and LWDD E-4 canal which also connects Lake Osborne. Water will be injected into the ASR wells when stages in the C-51 Canal are above 8.0 feet NGVD. Water will be retrieved from the ASR wells when canal stages are below 7.8 feet NGVD. Recovered water will be discharged to the C-51 Canal, Lake Clarke or Lake Osborne.

Location: Along the C-51 Canal in eastern Palm Beach County east of U.S. Route 441 and along the shores of Lake Clarke and Lake Osborne.

Counties: Palm Beach

Assumptions and related considerations:

- 1) It is assumed that groundwater ASR in proximity to the C-51 Canal is permissible without treatment.
- 2) Recovery rate of 70 percent for water stored by ASR.
- 3) Adverse water quality concerns associated with the Palm Beach International Airport will be minimized by not locating ASR wells east of Military Trail along the south side of the airport. ASR placement will resume adjacent to the West Palm Beach Spur Canal and continue south to Lake Clarke and Lake Osborne.

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Component VV6

Geographic Region: Central Eastern Palm Beach County

Component Title: Palm Beach County Agricultural Reserve Reservoir – SEE COMPONENT MAP 12

Purpose: Increase water supply for central and southern Palm Beach County by capturing and storing water currently discharged to tide.

Operation: The reservoir will be filled during the wet-season from excess water pumped out of the western portions of the Lake Worth Drainage District (LWDD) (back pumped). Water will be released back to LWDD to maintain canal stages during the dry-season. As with the base cases, regional water will be supplied to the LWDD when water levels fall below 15.8 feet NGVD. Water will be back pumped into the reservoir when water levels are above 16.0 feet NGVD in the LWDD system canals.

Aquifer Storage and Recovery (ASR) capacity was added to the reservoir to improve supply during dry seasons and droughts. Fifteen (15), 5-MGD capacity ASR wells are proposed with a total injection and recovery capacity of 75 MGD or about 116 cfs. Water from the reservoir will be injected when depths in the impoundment are above 1 foot. Water will be supplied from the reservoir up to the outflow capacity to meet local water supply demands before tapping water from the ASR system.

Design:

- 1) 1660 acres with a maximum depth of 12 feet (volume of 19,920 acre-feet) located west of US 441 and south of Boynton Beach Boulevard.
- 2) Inflow pump capacity = 500 cfs to be provided by two 250 cfs pumps, each with a pump on elevation of 16.0' NGVD and pump off elevation of 15.8' NGVD pulling from the C-16 Canal and the LWDD system canals.
- 3) Outflow structure capacity = 500 cfs @ 4 feet head for water supply deliveries to the LWDD canal system. The structure will consist of 4 - 4' diameter gated culverts with a design head of 4'.
- 4) Emergency overflow structure to WCA 1 = 300 cfs consisting of 5 - 5' diameter gated culverts.
- 5) Seepage estimated at 270 cfs will be collected and returned to the reservoir by a canal to be located on the north, east and south perimeters of the reservoir and two 150 cfs pumps, each with a pump on elevation of 12.7' NGVD and pump off elevation of 12.5' NGVD.

Location: The western portion of central Palm Beach County adjacent to WCA 1 and south of Boynton Beach Boulevard.

Counties: Palm Beach

Assumptions and related considerations:

- 1) Excess storage could be discharged to the LWDD during off peak times.
- 2) Canal conveyance improvements for LWDD's E-1 canal from the C-16 Canal south to the proposed north inflow pump station will be required.
- 3) Conveyance may need to be improved in the LWDD canal system to pass the proposed 500 cfs discharge from the reservoir.
- 4) No operation changes in the LWDD.
- 5) Recovery rate of 70 percent for water stored by the ASR.

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Component AAA

Geographic Region: Lower East Coast Service Areas

Component Title: Lower East Coast (LEC) Water Conservation

Purpose: The purpose of this component is to reduce the public water supply demands through the full implementation of the SFWMD's current mandatory water conservation program. The regional affect from the implementation of water conservation would include greater efficiency of the water utilized by the public water supply utilities and a year round reduction of the volume of water delivered from the regional water resource facilities to recharge coastal canals and wellfields.

Operation: On average, a six percent reduction in the projected 2050 withdrawals will be applied to each service area uniformly over each month of the simulation period. The percentage reduction will be based on the anticipated water conservation measures for each of the service areas.

Design: The current, mandatory water conservation program of the SFWMD was applied throughout the service area to the public water supply demand projections using IWR-Main forecasts. The percentage reduction is a result of the conversion of residential end users to ultra-low flow fixtures and daytime restrictions on lawn watering throughout the service areas, both practices are required by existing regulations. The percentage of the population using water-conserving fixtures is increased, thereby, reducing public water supply demands when compared to the 2050 Base. The percentage reduction is calculated from the 2050 Base that contains a moderate application of conservation techniques. The reduction applied in this component assumes full implementation of the District's water conservation program as predicted by IWR-Main.

The 2050 Base utility demands in the Lower East Coast Service Area were reduced by six percent on average in this Alternative.

Location: Lower East Coast

Counties: Palm Beach, Broward, Miami-Dade

Assumptions and related considerations:

- 1) Water conservation measures apply to all sources of water. It is most likely that demands met by reuse water would not be affected by restrictions in irrigation.

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Protect and Enhance Existing Wetland Systems along the Loxahatchee National Wildlife Refuge including the Strazzulla Tract (OPE)

Geographic Region: Water Preserve Area – Palm Beach County

Component Title: Protect and Enhance Existing Wetland Systems along the Loxahatchee National Wildlife Refuge (LNWR) including the Strazzulla Tract

Purpose: provide a hydrological and ecological connection to the Loxahatchee National Wildlife Refuge and expand the spatial extent of protected natural areas.

Operation: The additional lands to be purchased combined with the lands acquired will act as a buffer between higher water stages to the west and lands to the east that must be drained. This increase in spatial extent will provide vital habitat connectivity for species that require large unfragmented tracts of land for survival. It also contains the only remaining cypress habitat in the eastern Everglades and one of the few remaining sawgrass marshes adjacent to the coastal ridge. This area provides an essential Everglades landscape heterogeneity function.

Design: Water control structures will be constructed to provide hydrologic connections to WCA 1. This feature also includes the acquisition of approximately 3,335 acres of land adjacent to WCA 1 and the Strazzulla Tract.

Location: East of WCA 1 in central Palm Beach County

Counties: Palm Beach

Assumptions and Related Considerations:

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Acme Basin B Discharge (OPE)

Geographic Region: Water Preserve Area – Palm Beach County

Component Title: Acme Basin B Discharge – SEE COMPONENT MAP

Purpose: improve water quality discharge into WCA 1, attenuate peak flows and route discharge to regional storage reservoirs.

Operation: Develop small 310-acre wetland treatment area to treat Basin “B” runoff discharged to WCA 1. The remainder of the discharge shall be sent to a 620-acre surface water temporary storage reservoir to attenuate peak flows until such time as the water can be discharged to one of two alternative locations: Palm Beach County Agricultural Reserve Reservoir or the C-51 and Southern L-8 Reservoir (Palm Beach Aggregate) located west of the L-8 Canal.

Runoff will be directed to the temporary attenuation storage area until full, then additional runoff shall be directed to the Palm Beach County Agricultural Reserve Reservoir. If the Agricultural Reserve Reservoir is full then runoff will be directed to the C-51 and Southern L-8 Reservoir. As a last resort, additional runoff will be directed to the STA for treatment prior to discharge into the Refuge

Discharge to the Palm Beach County Agricultural Reserve Reservoir or the C-51 and Southern L-8 Reservoir will require improvements to the existing Acme C-25 canal, the extension of this canal east to the LWDD E-1 canal and a small pump station to pump runoff into the LWDD E-1 canal. The LWDD E-1 canal may also require expansion in order to pass the proposed discharge north or south to the previously mentioned reservoirs.

Design:

- 1) Stormwater treatment area: approximately 310 acres with a maximum depth of 4 feet located in Section 24, south of Rustic Ranches. The inflow pump capacity will be 200 cfs and pull from the Acme C-1 canal when the canal reaches elevation 14.0' NGVD and will turn off when the stage drops to elevation 13.0' NGVD or the STA stage is 4 feet. It will discharge into a distribution canal which will distribute flows west into the STA via eight, 36" diameter CMP culverts, each 50' long. At the western end of the STA, another canal will collect flows and direct them into WCA 1 via the outflow pump station (200 cfs) if water quality targets for the Refuge have been met. The outflow pump station will turn on when the stage in the STA reaches 18.3' NGVD and turn off when the stage drops to elevation 16.8' NGVD. Seepage will be collected and returned to the STA by two, 25 cfs pumps. They will be turned on when the stage in the seepage canal reaches 13.6' NGVD and turned off when the stage drops to elevation 13.0' NGVD.
- 2) Attenuation storage area: approximately 620 acres with a maximum depth of 8 feet located in Section 34. The inflow pump capacity will be 500 cfs and will pull from the ACME C-25 canal when the stage in the canal reaches elevation 14.0' NGVD and will turn off when the stage drops to elevation 13.0' NGVD or the stage in the reservoir is 8 feet. The reservoir will be baffled to prevent short circuiting. It will discharge via gravity back into the Acme C-25 canal when there is available storage in either the Palm Beach County Agricultural Reserve Reservoir or the C-51 and Southern L-8 Reservoir. The C-25 canal will be upgraded as necessary to pass the 500 cfs discharge and extended east from the boundary of the Acme Improvement District to the LWDD E-1 canal. A 500 cfs pump station will be constructed at the intersection of the extended C-25 and E-1. The pump will turn on when the stage in the C-25 canal is at elevation 13.5' NGVD and there is available storage in either the Palm Beach County Agricultural Reserve Reservoir or the C-51 and Southern L-8 Reservoir. The pump will turn off when the stage in the C-25 canal is at elevation 13.0' NGVD. Seepage will be collected and returned to the STA by two, 65 cfs pumps. They will be turned on when the stage in the seepage canal reaches 13.6' NGVD and turned off when the stage drops to elevation 13.0' NGVD.
- 3) Canal extensions or upgrades: approximately 15 miles – 1 mile of the Acme C-25 canal – canal extension and 1 mile upgrade, approximately 10 miles of the LWDD E-1 canal upgrade (4.5 miles south to C-16 Canal and 5.5 miles north to C-51 Canal) and 3 miles of the Acme C-24 canal upgrade.

Location: east of the Loxahatchee National Wildlife Refuge (WCA 1) at the southwestern end of the Acme Improvement District.

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Counties: Palm Beach

Assumptions and Related Considerations:

- 1) Water quality treatment for runoff entering WCA-1 is provided by a stormwater treatment area in order to meet applicable water quality standards.
- 2) Existing flood protection shall be maintained.
- 3) Runoff from Basin A shall be separated from Basin B and directed northward to the C-51 Canal where it shall be discharged through the permitted discharge facilities.
- 4) Land is available for treatment, attenuation storage and canal upgrades.
- 5) Sufficient peak flow attenuation storage will be provided to maintain existing flood protection.

Lake Worth Lagoon Restoration (OPE)

Geographic Region: Water Preserve Area – Palm Beach County

Component Title: Lake Worth Lagoon Restoration

Purpose: improve water quality and allow for the reestablishment of sea grasses and benthic communities.

Operation: sediment removal and sediment trapping within the C-51 Canal and sediment removal or capping within a 2.5 mile area downstream of the confluence of the C-51 Canal and the Lake Worth Lagoon. The elimination of the organically enriched sediment from the C-51 Canal discharge will provide for long term improvements to the Lagoon and ensure success for additional habitat restoration and enhancement projects planned by Palm Beach County.

Design: A prototype project will be conducted to determine if the Lagoon sediments will either be removed or capped.

Location: East and south of the City of West Palm Beach

Counties: Palm Beach

Assumptions and Related Considerations:

- 1) Sediment removal or capping within the area downstream of the confluence of the C-51 Canal and the Lake Worth Lagoon will not take place until the proposed reduction in freshwater discharge to tide from the C-51 Canal is accomplished (refer to components X6, Y6, LL6, and GGG6).